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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Heather D. Boek, et al.	
Serial No:	10/035,535	Examiner: Hoffman, J.
Filed:	10/26/2001	Group Art Unit: 1731
Title:	Methods and Apparatus For Forming A Chlorine-Doped Optical Waveguide Preform	

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Sir:

Transmitted herewith are three (3) copies of an Appeal Brief (10 pages with 5 page Appendix) in the above-identified application.

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Respectfully submitted,

Date: 4/23/04

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BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated December 2, 2003, in the application listed above. Applicant filed the Notice of Appeal on February 27, 2004, and now submits this Brief in triplicate, as required by 37 C.F.R. § 1.192(a).

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

II. RELATED APPEALS AND INTERFERENCES

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-35 were rejected in the final Office Action dated December 2, 2003. Those are the pending claims that are the subject of this Appeal and are set forth in the attached

Appendix. Applicant had amended claims 16 and 29 in an Amendment dated January 30, 2004.

IV. STATUS OF AMENDMENTS

The Amendment After Final Rejection filed on January 30, 2004 has not been entered.

V. SUMMARY OF INVENTION

The present invention relates to a method of manufacturing an optical waveguide preform. In particular, an optical waveguide preform is exposed to an atmosphere comprising a chlorine-containing compound, wherein the optical waveguide preform is doped with chlorine (page 5, lines 25-31). The atmosphere is at an absolute pressure substantially greater than about 1.013×10^2 kPa, i.e. substantially greater than one atmosphere (page 7, lines 1-3). In another aspect, the present invention is an apparatus for manufacturing an optical waveguide preform which includes a furnace defining a chamber adapted to contain the preform and also includes a heating device operable to heat the chamber (page 4, lines 2 - page 5, line 4). The pressure chamber is adapted to contain a large internal pressure (page 5, lines 5-8). A fluid control system is operable to provide an atmosphere including a chlorine-containing compound in the chamber at an absolute pressure substantially greater than about 1.013x102 kPa (page 5, line 22 – page 6, line 16). The present invention advantageously provides an optical fiber preform with an enhanced level of chlorine doping (page 3, lines 16-19). Such enhanced level of chlorine doping may provide improved viscosity matching between the chorine-containing layer of the preform and another layer, thereby reducing or minimizing the tensile or compressive stresses resulting from differential viscosities during the draw process (page 3, lines 20-24).

VI. ISSUES

Issues presented for consideration in this Appeal are:

A. Whether claims 16-18 and 29-31 comply with the written description requirement under 35 USC § 112, first paragraph.

B. Whether claims 32-35 are patentable under 35 U.S.C. § 102(b) as being novel over US Patent 5,145,507 (Kyoto et. al).

C. Whether claims 1-31 are patentable under 35 U.S.C. § 103(a) as being nonobvious over US Patent 6,116,055 (Ishikawa et al.) and further in view of Kingery's "introduction to Ceramics, pages 219-226.

VII. GROUPING OF CLAIMS

In compliance with 37 C.F.R. § 1.192(c)(5), Appellants state that all of the claims stand or fall together.

VIII. ARGUMENTS

A. Claims 16-18, and 29-31

Claims 16-18 and 29-31 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Claim 16, as originally filed read,

> 16. The method of claim 1 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein: the soot preform and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150°C; and the chlorine doping of the soot preform improves matching of the viscosities of the inner layer and the outer layer at said drawing temperatures as compared to a non-chlorine doped inner layer.

The Examiner rejected claim 16 in his first Office Action on the grounds that "whereas two layers may match, a single layer cannot match nothing – it has to match with something else. Alternatively, if the inner layer [must] match with itself, it has to be a perfect match – and thus no other match can be better – nothing is better than that which is perfect"

In their response, Appellants disagreed that the claim as presented was unclear, but found the Examiner's reasoning to be not well articulated. Nevertheless, Appellants amended claim 16 to include, inter alia, "...the chlorine doping of the soot preform improves mismatching of the inner layer and the outer layer...compared to a like preform with a non-chlorine doped inner layer." Claim 29 was similarly amended.

In his final Office Action the Examiner rejected claims 16 and 29 under U.S.C. §112, first paragraph, on the grounds that there is "...no support for the new limitation of improving a mismatch" and further under 35 U.S.C. §103(a), observing that "...one could arbitrarily designate any preform to be 'like' any other preform in that they are both preforms, or that they are both cylindrical. One can also designate what one constitutes an improvement as being either a reduction or an improvement – the claim does not specify which way the mismatch is improved."

In their response to the Examiner's final Office Action, Appellants addressed the §112 issue by returning "mismatch" to the original "matching" term explicitly used in the specification. The amendment was not entered on the grounds that it a) raised new issues, and b) was not deemed to place the application in better condition for appeal.

Appellants respectfully disagree. To begin, Appellants are unclear as to why returning the wording to what is essentially the same wording as originally filed, albeit with several other clarifying changes, raises new issues. Additionally, in addressing the §112 rejection applied by the Examiner, Appellants have attempted to place the application in better form for

appeal. Indeed, in their response to the first Office Action, Appellants specifically requested that the Examiner suggest such wording as might be appropriate should Appellants' amendment not make the claim clear.

As to the second reason for rejection regarding claims 16 and 29, Appellants disagree with categorization of the issue as being a §103 rejection. That notwithstanding, Appellants contend that the meaning of the claim as proposed in their January 30, 2004 amendment after final rejection would be clear to one of ordinary skill in the art. That is, everything else being equal (a "like" preform), the viscosity of the inner layer is better matched with the viscosity of the outer layer in a preform which is chlorine doped than if the preform had not been chlorine doped. Accordingly, the §112 rejection is overcome and the amendment should be entered and claims 16 and 19 allowed.

B. Claims 32-35

Claims 32-35 stand finally rejected under 35 U.S.C. §102(b) as being anticipated by Kyoto et al. (U.S. Patent No. 5,145,507).

The Examiner points to Figure 3 and that text which describes Figure 3 as anticipating Appellants' invention, and suggests that the differences between Kyoto and Appellants' invention, i.e. gases and pressures, are method of use limitations. Appellants respectfully disagree.

Functional language in an apparatus claim requires that the apparatus possess the capability of performing the recited function. Intel Corp. v. U.S. International Trade Commission, 948 F2.d 821, 832, 20 USPQ2d 1161, 1171 (Fed. Cir. 1991).

First, neither Figure 3 nor the text in Kyoto et al. provide any evidence that the pressure chamber depicted is capable of attaining a pressure substantially greater than one atmosphere. The Examiner contends that "the particular gases and pressures are method of use limitations and do not substantially impact any structural limitations of the apparatus." Appellants assert that the limitations a) "a pressure chamber capable of attaining an absolute pressure substantially greater than 1.03×10^2 kPa" and b) "a fluid control system operable to provide an atmosphere including a chlorine containing gas in said chamber at an absolute

pressure of substantially greater than 1.03 x 10^2 kPa" function as structural limitations upon the chamber and fluid control system to which they refer, and constitute a proper structural definition of the apparatus. As required, the claims are clear, and a person of ordinary skill in the art would understand their meaning.

Kyoto et. al does not teach a pressure chamber capable of attaining an absolute pressure substantially greater than 101.3 kPa, or a fluid control system operable to provide a chlorine gas containing atmosphere at an absolute pressure substantially greater than 101.3 kPa. For at least the reasons given above, the Board should reverse the rejection and find claim 32 allowable.

C. Claims 1-31

Claims 1-31 stand finally rejected under 35 U.S.C §103(a) as being unpatentable over U.S. Patent 6,116,055 (Ishikawa et al.) and further in view of Kingery's "introduction to Ceramics, pages 219-226.

If Kingery and Fick's Law Propose High Pressure, Why did Ishikawa Ignore it?

The Examiner points to Kingery and Fick's law, and invokes the ideal gas law, as rendering it obvious to use as "...high a pressure as possible so as to maximize the amount of chlorine in the preform." The Examiner notes that one of ordinary skill in the art is familiar with such laws. Certainly the most obvious observation is that Ishikawa would undoubtedly have been aware of Fick's law and the other equations and laws cited by the Examiner, and yet armed with the knowledge of his own invention, the path Ishikawa chose was not one which included a total pressure substantially greater than one atmosphere, suggesting that knowledge of Fick's and other laws was not sufficient motivation to explore high pressure doping. The Examiner argues that use of a "...higher pressure is merely a question of convenience..." and that one of ordinary skill in the art would interpret this as a teaching that one may use a higher pressure if one will accept the requirement of using a complex system." However, Ishikawa et al. do not simply say a complex system is required, but present it as a

problem. Applicants respectfully disagree with the Examiner's argument, and assert that a person of ordinary skill in the art would be discouraged from the use of high total system pressure.

Teaching Away

Appellants assert that Ishikawa et al. teach away from Appellants' invention by discouraging the use of a total pressure in excess of one atmosphere. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." In re Gurley, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).

As presented supra, Ishikawa et al. as a whole teach that the doped amount of chlorine may be controlled by the partial pressure of $SiCl_4$ rather than the total pressure of the system. Ishikawa et al. repeatedly point to the use of a partial pressure of $SiCl_4$ gas *less than a single atmosphere* (emphasis added). Indeed, Ishikawa et al. state that a partial pressure more than one atmosphere "entails a problem of complex furnace structure" (column 1, lines 61-65). Ishikawa et al. not only do not provide evidence that a total pressure substantially greater than one atmosphere will be effective, but discourage the use of such pressure by pointing out that even a partial pressure in excess of one atmosphere entails a problem associated with furnace design. Ishikawa is silent as to what that problem might be, and how one might overcome it.

Even assuming, arguendo, that Ishikawa et al. suggest using a total pressure greater than one atmosphere, Ishikawa et al. do not teach, suggest, or otherwise motivate use of a

total pressure substantially greater than one atmosphere as stipulated in Applicants' claims. Accordingly, Ishikawa does not make out a prima facie case of obviousness when viewed as a whole.

Examiner is Using Improper Hindsight Reasoning

The Examiner asserts that it would be obvious to use as high a pressure as possible given the teachings of Ishikawa et al., Kingery and natural laws (ideal gas law). However, a showing of a suggestion to combine must be clear and particular, and hindsight must be rigorously avoided. Ecolochem Inc. v. Southern California Edison, 56 USPQ2d 1065 (CAFC 2000).

The Examiner begins with Appellants' disclosure as a blueprint, and then seeks references which, when combined, yields Appellants' invention. Neither Ishikawa et al. nor Kingery suggest that a total pressure substantially greater than one atmosphere will be effective to increase the doped amount of chlorine. As discussed supra, Ishikawa et al. specifically discourage extending the partial pressure above one atmosphere, let alone substantially above one atmosphere, and do not address the total system pressure. Kingery is silent on the subject. With regard to the general laws of nature cited by the Examiner, "..all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious...", Diamond, Commissioner of Patents and Trademarks v. Diehr and Lutton (450 U.S. 175, 209 USPQ 1 (SC 1981), footnote 12.) The Examiner argues that it would have been obvious to apply those laws in this instance, but provides no specific evidence for why one would seek to modify Ishikawa et. al beyond broad, conclusory statements. By combining Ishikawa et al., Kingery and the ideal gas law, the Examiner is indulging in impermissible hindsight.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a prima facia case of obviousness, and that independent claims 1 and 19 are allowable over the prior art of record.

IX. CONCLUSION

In conclusion, Appellants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the pending claims 1-35.

If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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4/23/04

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APPENDIX TO BRIEF ON APPEAL

The claims on appeal are as follows:

1. **(previously amended)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas and thereby doping the soot preform with chlorine, wherein the absolute pressure of the atmosphere is substantially greater than 1.013×10^2 kPa.

2. **(original)** The method of Claim 1 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

3. **(original)** The method of Claim 1 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

4. **(original)** The method of Claim 1 wherein the mole percentage of chlorine present in the atmosphere is greater than about 20%.

5. **(original)** The method of Claim 1 wherein the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

6. **(original)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is greater than about 1%.

7. **(original)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

8. **(previously amended)** The method of Claim 1 wherein the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, Cl_2, CCl_4, $SOCl_2$, $POCl_3$ and combinations thereof.

9. **(original)** The method of Claim 1 wherein the atmosphere is at a temperature of at least about 1000 °C.

10. **(original)** The method of Claim 1 wherein the atmosphere is at a temperature of between about 1250 and 1350 °C.

11. **(original)** The method of Claim 1 wherein the absolute pressure of the atmosphere is greater than about 2.026×10^2 kPa.

12. **(original)** The method of Claim 1 wherein the absolute pressure of the atmosphere is between about 4.052×10^2 and 16.32×10^2 kPa.

13. **(original)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of at least 60 minutes.

14. **(original)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

15. **(previously amended)** The method of Claim 1 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

16. **(currently amended)** The method of Claim 1 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping of the soot preform improves ~~mismatch~~ matching of the viscosities of the inner layer and the outer layer at said drawing temperatures as compared to a like perform with a non-chlorine doped inner layer.

17. **(previously amended)** The method of Claim 16 wherein the inner layer includes

silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum and titanium.

18. **(previously amended)** The method of Claim 17 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

19. **(previously amended)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas for a period of at least 60 minutes and thereby doping the soot preform with chlorine, wherein:

the absolute pressure of the atmosphere is substantially greater than 1.013×10^2 kPa;

the mole percentage of chlorine present in the atmosphere is greater than about 20%;

the weight percentage of chlorine present in the soot preform is greater than about 1%;

the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, Cl_2, CCl_4, $SOCl_2$, $POCl_3$ and combinations thereof; and

the atmosphere is at a temperature of at least about 1000 °C.

20. **(original)** The method of Claim 19 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

21. **(original)** The method of Claim 19 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

22. **(original)** The method of Claim 19 wherein the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

23. **(original)** The method of Claim 19 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

24. **(original)** The method of Claim 19 wherein the atmosphere is at a temperature of between about 1250°C and 1350 °C.

25. **(original)** The method of Claim 19 wherein the absolute pressure of the atmosphere is greater than about 2.6×10^2 kPa.

26. **(original)** The method of Claim 19 wherein the absolute pressure of the atmosphere is between about 4.052×10^2 and 16.32×10^2 kPa.

27. **(original)** The method of Claim 19 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

28. **(previously amended)** The method of Claim 19 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

29. **(currently amended)** The method of Claim 19 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping improves ~~mismatch~~ matching of the viscosities of the inner layer and the outer layer at said drawing temperatures as compared to a like perform with a non-chlorine doped inner layer.

30. **(previously amended)** The method of Claim 29 wherein the inner layer includes silica and a material selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

31. **(previously amended)** The method of Claim 30 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

32. **(previously amended)** An apparatus for manufacturing an optical waveguide preform using a soot preform, said apparatus comprising:

a) a furnace defining a pressure chamber adapted to contain the soot preform and including a heating device operable to heat said chamber, the pressure chamber capable of attaining an absolute pressure substantially greater than 1.013×10^2 kPa; and

b) a fluid control system operable to provide an atmosphere including a chlorine-containing gas in said chamber at an absolute pressure of substantially greater than 1.013×10^2 kPa.

33. **(original)** The apparatus of Claim 32 wherein said fluid control system includes:

a flow control device selectively operable to prevent and allow flow of said atmosphere into and out of said chamber;

a pressurizing device operable to pressurize said atmosphere in said chamber to a selected pressure; and

a controller operative to control said flow control device and said pressurizing device.

34. **(original)** The apparatus of Claim 33 wherein said flow control device includes at least one valve.

35. **(original)** The apparatus of Claim 33 wherein said pressurizing device includes a compressor.